REVIEW OF EPA COMENTS DATED 9/19/16
PHASE III REMEDIAL ACTION PLAN
FORMER AEROVOX FACILITY
NEW BEDFORD, MASSACHUSETTS
RTN 4-0601

1.0 INTRODUCTION

Massachusetts Department of Environmental Protection (MassDEP) requested that Nobis Engineering, Inc. (Nobis) review and provide technical comments regarding the US Environmental Protection Agency (EPA) comments on the August 2016 Phase III Remedial Action Plan (RAP) prepared by Brown and Caldwell for the Former Aerovox Facility (the Site).

Comments below are numbered in the same sequence as the EPA comments.

2.0 EPA GENERAL COMMENTS

1. On March 11, 2016, MassDEP issued its approval of the Partial Phase II. This letter identified many deficiencies in the Phase II Report and indicated that the deficiencies should be addressed in the Phase III or that a schedule for collecting data to address the deficiencies should be provided. It does not seem that any of the deficiencies identified in MassDEP's March 11, 2016 have been addressed in the Phase III.

   Response: The specific deficiencies/additional information required identified in the Phase II conditional approval include the following:

   a. Description/discussion of the hydrologic conditions of the Acushnet river: not addressed specifically (examples: Historic flooding in New Bedford Harbor; The elevation of the velocity zone along the sheet pile wall at the eastern boundary of the Site. Flooding is discussed in the context of OU1 but not the other OUs.
   b. Effect of tide fluctuations/hydraulic gradient on DNAPL mobility, migration, and potential river discharge: not addressed.
   c. Discussion of sheet pile wall and its effectiveness relative to preventing contaminant migration:
      1.c.1 Age, thickness, and material type and expected reaction to the environment: not addressed.

1.c.2 Depth and lateral extent relative to locations of known contamination): not addressed.

d. Updated figures depicting source areas and suspected DNAPL zones: not addressed entirely. Appendix A does include plan view and cross-sections of the DNAPL zone at the MW-15 cluster, but does not appear to depict the shallower DNAPL in soil that is being addressed under the IRA.

e. DNAPL and dissolved-phase contamination extent in bedrock: This request was not addressed. The text states that DNAPL was only identified in specific bedrock wells, and does not attempt to determine a possible lateral extent. Previous MassDEP comments also raised questions regarding DNAPL extent in bedrock. It is difficult to develop a method to evaluate extent, and installation of additional wells through/into the DNAPL zones could also create new pathways for mobility. However, additional well control should be considered outside areas of expected DNAPL to better define the contaminant plumes.

f. Coyne property access: this data gap does not seem to have been addressed at all in the Phase III.

DRAFT

2. On July 15, 2016, MassDEP issued a letter providing comments and clarifications on the IRA Plan Modification. In that letter, DEP stated: “If it is determined that the active/passive free-product recovery system is not adequately removing the DNAPL, and therefore not achieving the objectives of the IRA to prevent the potential migration of DNAPL into the Acushnet River in response to the scheduled EPA dredging of the New Bedford Harbor, MassDEP may require that AVX implement a containment system to prevent migration of the DNAPL in response to EPA dredging.” How will MassDEP consider this requirement in its evaluation of the Phase III? As discussed further below, the Phase III does not address DNAPL and, it appears, assumes that the IRA activities will adequately address DNAPL conditions. As EPA has expressed, we have reservations about the effectiveness of the proposed recovery systems to be implemented under the IRA at containing the DNAPL in the MW-15 area, a highly viscous, non-polar, separate phase liquid. FPR systems have not been shown to substantially remediate sites with DNAPL. They are moderately effective at removing DNAPL that enters the wells or trenches used for recovery, but not effective at promoting significant flow of DNAPL from the formation to the recovery system. If the proposed recovery system is ineffective at source control/containment of DNAPL, this may have

significant implications on the effectiveness and constructability of the proposed permeable reactive barrier wall.

Response: For the system to be ineffective, EPA must show MassDEP DNAPL is mobile and leaking into the harbor. The existing monitoring system may not have enough detail to show that. If AVX removed all the product in MW-15D and MW-15B, EPA could easily make the argument the NAPL is still mobile. Potential additional steps to determine containment effectiveness include regular monitoring of accessible sediment (e.g. low-tide monitoring for sheens) and sediment sampling for comparison to baseline conditions. Monitoring wells may be installed as far downgradient of the DNAPL areas as possible to evaluate groundwater concentrations exiting the property as an indicator of potential NAPL.

3. <u>Interface with the Harbor Remediation:</u> There is almost no mention of the ongoing remediation of harbor sediments by EPA, particularly the well-communicated fact that a significant amount of sediment directly adjacent to the Site is scheduled for removal. This needs to be taken into consideration when evaluating the type of barrier installed along the eastern Site boundary, i.e., is the geotechnical stability of a new barrier compatible with shoreline dredging. If a vertical barrier is installed as a part of the remedy, it will be important for the construction of the vertical barrier to include structural elements that will ensure that the wall maintains its integrity during implementation of the harbor excavation. The specific location of that barrier needs to be considered as well; if it is installed landward of the existing sheet pile wall, what is the intended plan for the material between the two barriers. Nearly all of this area is considered within a confirmed or potential DNAPL zone, i.e. even a relatively narrow band is expected to contain a significant amount of contamination that would eventually be released to the harbor if not removed or fully contained.

   Response: Agreed. Remedial options with components close to the shoreline (OU1, OU3, and OU4) should address barrier stability, if applicable, and potential shoreline impacts. Section 4.2 and Section 5 of the RAP should also be revised to include discussion of potential migration to the river and how to monitor (see below). OUs for which this comment may apply include OU1 and OU3 (and possibly OU4 for shallow bedrock).

4. Monitoring Plan: A monitoring plan to address potential releases to the harbor during remedy construction, along with a long-term monitoring plan to address remedy effectiveness in perpetuity will be critical elements of the Phase IV. Key elements of these monitoring plans should be laid out in any approval of a Phase III remedial action plan.

   Response: For OU1 and OU3A, each of the alternatives include continued long-term monitoring as part of the AUL. Agree that a construction monitoring plan can be added to alternatives that may involve releases caused by construction close to the river (OU1, OU3A, OU3B, and possibly OU4), although the timing and details may need internal discussion.

5. TSCA Determination: The Phase III references the TSCA Determination that was issued for the NTCRA as the TSCA Determination for the Site, including referencing this as the TSCA Determination for the PCB contamination extending onto the Titleist property. Consistent with EPA's 8/29/16 email to Marilyn Wade, of Brown and Caldwell, this Determination was written specifically for the NTCRA and does not provide for approval of work conducted under the 21E program. For the 21E work to be compliant with TSCA, a separate review and approval process with EPA's TSCA program must be established in conjunction with the 21E process. For your information, EPA's TSCA program is communicating directly with AVX on this matter and will keep MassDEP apprised. MassDEP should make it clear to AVX that AVX's pursuit of review and approval from EPA's TSCA program should not, in any way, impact the schedule to complete the 21E work.

   Response: Will defer to MassDEP for this.

6. Detailed Evaluation of Alternatives: Discussions of the effectiveness of the proposed remedial alternatives for overburden groundwater were not comprehensive. In general, the ratings are subjective and did not appear to fully consider the possible effects of each alternative on the harbor cleanup efforts. In fact, it is not clear that the selected remedial alternative for overburden groundwater (OU3B-4) will be effective with respect to preventing contaminant migration to the river. Hydraulic containment has been used for

a wide variety of sites and contaminants and does not have the level of uncertainty for effectiveness that a PRB would have. It would seem Alternative OU3B-2 and B-3 would be much more likely of achieving a permanent solution due to the presence of both an impermeable barrier and a hydraulic containment system.

Response: Agreed. Note that significant bedrock underflow via extremely transmissive shallow bedrock fractures may complicate hydraulic containment. However, use of groundwater extraction with containment may help to alleviate this issue. As mentioned in Nobis' general comment 5, the uppermost bedrock is currently a significant data gap. Agreed that a PRB would be much more complex, and would be harder to optimize/fix once in place. In addition, if any NAPL flows through the PRB, it will decrease its effectiveness. Minimal information is presented to adequately evaluate the potential effectiveness of this alternative.

7. <u>Impacted Shallow Uncapped Soils, OU1:</u> EPA has recent PCB sediment and soil PCB data for soils within the intertidal area and the shoreline of the Titleist property. Our sampling data extends to the east and south of the PCB contamination defined as OU1. EPA is in the process of preparing a transmittal letter to the property owner to share this information with them. As soon as we have communicated the data to the property owner and have their permission to share the data with MassDEP, AVX and the City, we will provide the data to all parties. This data clearly shows that AVX has not adequately delineated the extent of the impacted shallow soils on the Titleist property and that the shallow soils contamination extends beyond the fenced area where AVX limited its sample collection activities. Also note that AVX's sampling program provided for the collection of 2 foot soil intervals such that shallow soil samples were composited soils over the 0-2 ft depth interval. Higher concentrations in the 0-1 ft interval may not be identified when evaluated in a 0-2 ft composited soil interval. EPA's samples are based on 1 foot intervals (e.g., 0-1 ft, 1-2 ft).

   Response: Comment noted regarding updated soil concentrations. The current OU1 southeastern boundary is shown as the property line. This property line does not extend as far as the mean high water mark, as shown on Figure 4.3.1-1 through 4.3.1.4. Given that the remedial alternatives for OU1 (with the exception of Alternative 2) all specify excavation of soils to the property line depicted, it is not unexpected that contamination

DRAFT

may be encountered south and east of the property line, and north/west of the mean high water mark. The question is whether this strip of land is the AVX's responsibility. Massachusetts shoreline law states that the shoreline property is owned to the mean low-tide level (however, certain public-access rights exist within the intertidal zone). Therefore, the intertidal zone and the areas upland of the mean high-tide level are owned by AVX. The 2010 ACO excludes areas that are part of the New Bedford Harbor Superfund Site (page 2) was defined in paragraph 5.I of the 1992 supplemental Consent Decree as including "New Bedford harbor, the Acushnet River Estuary extending north to the Wood Street Bridge, and any adjacent marine waters and sediments and shoreline areas which are the subject of EPA's current Remedial Investigation and Feasibility Study". Nobis was unable to identify any more-specific boundary/responsibility information.

8. <u>DNAPL:</u> The occurrence of DNAPL in the Site overburden and its potential impact on remedial approaches receives very limited discussion; it is not even included in the description of OU3. Although "NAPL" is identified as a media in Section 4.1.4 for the initial screening of remedial alternatives, DNAPL remedial considerations are not otherwise developed in the Phase III. For DNAPL, to reach a Permanent Solution, the MCP 40.1003(7) requires the following: 1. non-stable NAPL is not present under current site conditions and for the foreseeable future; and 2. all NAPL with micro-scale mobility is removed if and to the extent feasible based upon consideration of CSM principles.

   Section 4.1.4 identifies both excavation and free product recovery and offsite disposal as technologies likely to achieve a Permanent Solution for NAPL; however, none of the alternatives include either of these technologies or any explanation of how AVX will determine NAPL is either not present or is removed to the extent feasible.

   The figures of DNAPL area and cross section presented in Appendix A show a small DNAPL footprint contained within the site boundaries that is quite reduced over what had been presented previously by URS (October 2014) and does not include the area more recently identified by MIP-53 and MIP-54, nor does it account for EPA's data collection efforts for adjacent harbor sediments. There is no supporting discussion on the rationale for the reduction of the DNAPL zone area. Please also refer to EPA's 1/13/16 comments emailed to MassDEP on the Phase II, Comment 1, regarding the inadequate delineation of the extent of DNAPL. It is unclear why the accepted characterization guidance of Kueper and Davies (2009) of defining a confirmed/probable source zone and potential source zone has not been used to help inform the remedial alternatives assessment.

Response: Note: NAPL is currently addressed under the IRA process. Can AVX confirm that NAPL will be entirely addressed this way, including additional investigations/work in deep overburden and shallow bedrock? If not, then it should be addressed in the Phase III RAP.

IRA Status Report #2 (URS, October 2014) does not appear to have a figure with a DNAPL footprint. Internal meeting notes from 12/14/15 meeting indicated that URS did provide a figure of potential NAPL zones earlier, but the LSP of-record stated that the figure was based on concentrations only and was superseded by more recent data. IRA Status Report 7 does have updated DNAPL in soil locations (Appendix A, excavation and cross-section plan C-002), but only for the shallow DNAPL that will be addressed under the IRA.

DRAFT

Note that additional geotechnical samples were collected and their applicability for use in further evaluating NAPL migration were discussed in IRA status report 6 (AECOM, 2016), but for an unknown reason, IRA status report 7 (Brown and Caldwell, 2016a) does not evaluate these samples. While DNAPL evaluation is proceeding under the IRA, the DNAPL assessment should be incorporated into the Phase III as a discussion of potential bedrock movement in deep overburden and bedrock, and used in the evaluation of alternatives.

Regarding the use of Kueper and Davies (2009) to delineate the source zone: this reference does present a list of lines of evidence and a flowchart of iterative data collection to determine DNAPL source zones. Suggested lines of evidence include visual observations, concentrations in soil above threshold DNAPL saturation/partitioning, site history, vapor concentrations, dye testing, magnitude of groundwater concentrations, plume persistence, anomalous groundwater concentrations, groundwater concentration trends with depth and time, and detection of highly sorbing/low solubility compounds in groundwater (e.g. PCBs). These lines of evidence have been used, along with several other techniques, to delineate source zones at AVX, although not using a formal flowchart/system such as that outlined by Kueper and Davies. The use of UVOST, MIP, soil borings, MALM, and groundwater samples represent a reasonable effort to delineate the DNAPL source zones. One way to address this would be to request a formal, complete discussion of the delineation of the source zones and the DNAPL CSM, rather than having the reviewer backtrack through several different documents. Ideally, this would have been done for the Phase II.

9. Selection of Permeable Reactive Barrier Wall as an Element of the Remedy for Aerovox Property Overburden Groundwater, OU3B: EPA has significant concerns about the effectiveness and constructability of the PRB. Considering existing guidance and literature on PRBs, EPA has not found any information to support that a PRB will be effective at treating PCBs. PRBs can be effective at treatment of dissolved-phase CVOC groundwater plumes and are typically constructed at the downgradient edge of a dissolved-phase plume. At this Site, AVX is proposing to construct a PRB through a DNAPL source area and highly-contaminated CVOC and PCB co-mingled groundwater plume with the river immediately to the east in a system with brackish water where groundwater flow reverses twice-daily as a result of the tides. These significant complexities are not adequately accounted for in the effectiveness, reliability or implementability factors in the evaluation of the OU3B-4 alternative. Additional specific concerns with a PRB wall are as follows:
    a. The PRB is proposed to be constructed almost as a "funnel-and-gate" system with impermeable vertical barriers preventing flow around the PRB. However, industry experience has shown that funnel-and-gate systems do not reliably direct groundwater flow through the PRB (i.e., "gate"). Therefore, effective installation of the PRB would likely require a longer PRB than assumed in the Phase II.
    b. In recent years, zero-valent ion (ZVI) barriers have been shown to not last as long as previously thought (typically assumed to last for at least 30 years). It should not be assumed that a ZVI barrier will work and persist without significant testing to ensure that the groundwater geochemical conditions will not result in passivation or clogging of the ZVI and degradation of the efficacy of the iron. If a PRB is pursued, EPA recommends bench-scale testing of ZVI before selection of this remedy. Pilot testing of the wall is not the most effective method of evaluating this proof of concept.

DRAFT

c. The Phase III recognizes that replacement of the PRB may be required over the lifetime of the remedy. However, there is no estimate of the number of times refreshing the PRB will be required. There do not appear to be costs included in the estimates for refreshing the PRB in the rating of this alternative.
d. The evaluation of the effectiveness of the PRB with respect to preventing migration of dissolved PCBs did not appear to consider the possibility that migration may be facilitated by dissolved organic material, potentially including the organic material proposed for inclusion in the PRB design.
e. It appears that the PRB was conceptualized to be constructed using material with a hydraulic conductivity similar to or greater than that of the aquifer materials. In practice, this can be difficult to accomplish. If the hydraulic conductivity of the PRB is significantly less than the aquifer, groundwater elevations upgradient of the PRB will increase and likely result in additional contaminant migration from the overburden, through the bedrock, and into the harbor. Alternatively, if the hydraulic conductivity is higher, this could increase communication between the aquifer and the Acushnet River.
f. One-pass trenching can be an effective method of PRB installation, however it is unclear whether this method would be able to match the contours of the top of the bedrock and ensure a good "seal" along the top of the rock. The deep overburden will tend to be the zone that conducts the highest concentrations of DNAPL COCs. The remedy should include provisions to prevent a gap in the barrier at the bottom.
g. How will performance be measured and monitored? What provisions will there be for further actions if the PRB is not performing as designed and there is breakthrough to the east into the harbor?

DRAFT

Given these concerns, the ultimate performance of the PRB should be considered to be uncertain. How will a determination be made regarding whether a PRB wall will be effective and what role does MassDEP play in that determination? If MassDEP has information (e.g., guidance, literature, case studies) that addresses EPA's concerns with the PRB and that MassDEP may rely on for approval of the selected OU3B-4 remedy, please provide that information for EPA consideration. If, based on the MassDEP's evaluation of the Phase III or results of the Pilot Studies, a determination is made that a PRB wall will not be effective, what are the next steps under the MCP and 21E program?

Will MassDEP have the authority to require selection of one of the other, more technically practicable but more costly alternatives, like OU3B-3?

Response: Responses noted below using the same lettering system as the comments.

a. Nobis agrees that redirecting groundwater flow through a funnel and gate system may not be as effective as using a longer PRB. However, appendix C, Section 2.3 does state that groundwater modeling showed that 99 percent of the water in the "contained area" of the glacial outwash material would pass through the PRB. Please note that both Nobis and EPA identified concerns with the modeling that we would recommend resolving as part of the final PRB design.
b. Nobis agrees that bench-scale testing and possibly laboratory models/column-testing should be conducted prior to in-field pilot testing. Such tests should evaluate a range of Site aquifer materials (till, peat, outwash) using both groundwater and surface water. It is noted that the schedule of such evaluations should be compressed to less the 6 months to accommodate EPA. The pilot testing should also include testing for PCB response as well as CVOCs
c. Nobis agrees that the costs should reflect the cost of replacing/regenerating PRB material at a reasonable timeframe, with a justification for the selected replacement rate, especially given that part of the purpose is to adsorb (i.e. not necessarily degrade) PCBs.
d. This concern should be addressed as part of the bench-scale testing discussed in comment b.
e. Nobis agrees that the hydraulic conductivity of the PRB will need to be designed based on high/low hydraulic conductivities in the local aquifer. This may require additional evaluation of hydraulic conductivity. However, if the PRB performs as-intended, slightly increased aquifer connection should not be a significant problem.
f. Note – posed similar question in Nobis' comments regarding keying the PRB into competent rock
g. Performance monitoring is included in the description of Alternative 4 in Section 4.3.3.2; however, monitoring specifics and decisions made based on the results may not be germane to the Phase III.

DRAFT

<u>Internal note to MassDEP</u>*: EPA is asking MassDEP to provide technical*

support/justification for AVX's alternative. A PRB must be tailored to the site-specific geochemical and aquifer properties in order to be effective. The data gaps EPA has identified may be resolved with further testing by AVX. Insufficient data and engineering is presented to determine the effectiveness of PRB and in-situ treatment alternatives. Note that emulsified zero-valent iron has been studied in saltwater environments (Brooks et. Al, 2005), and was shown to be slightly less effective than freshwater conditions.)

10. Bedrock Transport Pathway: The proposed selected remedy is dependent on adequate contaminant treatment in bedrock, since there would be no effort to prevent groundwater flow from bedrock to the river. Based on review of bedrock hydrology adjacent to the Acushnet River, it appears that a significant portion of the contaminated bedrock aquifer is in good hydraulic communication with the river. With respect to control of contaminant migration from the site to the harbor, it would appear that a low permeability vertical barrier extending some depth into the bedrock and combined with groundwater extraction for hydraulic gradient control, would be significantly more effective for controlling bedrock groundwater.

    Response: Nobis agrees. Note that we recommended including bedrock hydraulic control in our comment 7.

DRAFT

3.0 SPECIFIC EPA COMMENTS

1. <u>Section 2.4.1, page 2-6, and Section 3.4, page 3-4:</u> Please refer to EPA's 1/13/16 comments emailed to MassDEP on the Phase II, Comment 2, on groundwater. AVX continues to make the same statements in the Phase III as were made in the Phase II CSA to imply that AVX is incorrectly relying on the Harbor cleanup to avoid its 21E obligation to fully address groundwater migration. MassDEP should make clear that to reach a Permanent Solution for migration control the MCP requires that AVX show the plumes of dissolved OHM in groundwater are stable and contracting independently of EPA Harbor cleanup. AVX must conduct adequate and sufficient monitoring of the selected remedy for overburden and bedrock groundwater to ensure migration control regardless of EPA Harbor cleanup. Further, footnote 1 on page 2-6 and footnote 3 on page 3-4 references the New Bedford Harbor ROD as setting remedial goals/standards for PCBs in the harbor. The ROD sets remedial goals for PCBs in sediment. The

discussion in these sections of the Phase III are on groundwater concentrations. The ROD does not set remedial goals for groundwater.

Response: The initial portion of this comment may relate to how MassDEP wishes to address AVX's assertions with respect to its obligations. Response to this portion of the comment is deferred. The ROD does not establish groundwater remedial goals. The footnote should be revised to reflect this.

2. <u>Section 3.4, page 3-4:</u> The 3rd paragraph states: "Groundwater analytical data indicated that deep overburden groundwater exceeds the Method 1 GW-3 standards for PCBs and TCE." (emphasis added) Pursuant to the Phase II, both shallow and deep overburden groundwater exceeded Method 1 GW-3 standards for PCBs and TCE. The discussion concludes with the statement on a potential discharge of groundwater with elevated contaminant concentrations. The mass flux evaluation approach presented for the bedrock system in Section 3.5 should be applied to the overburden system to estimate contaminant loadings to the harbor.

   Response: Nobis assumes that Brown and Caldwell did not include the mass flux from overburden because they assume that overburden groundwater will be hydraulically contained or treated prior to exiting the Site, whereas bedrock cannot be readily treated (note that Brown and Caldwell wrote-off hydraulic containment in the initial evaluation, which may have been premature). However, there is acknowledged mass flux in deep overburden under the current sheetpile wall (below the peat layer), due to (at a minimum), concentrations in MW-15D. Overburden mass flux calculations based on plume configuration, similar to the bedrock evaluation would be useful to help develop/evaluate overburden alternatives.

3. <u>Section 3.4, page 3-5, third bullet:</u> Why is achieving a "stable" plume in bedrock groundwater a remedial action goal when the current (and likely stable) form of the plume is resulting in a discharge of contaminants to the harbor?

   Response: Note that the language cited is a goal of the LNAPL guidance; AVX probably carried it through to DNAPLs as well.

DRAFT

4. Section 3.5.1, page 3-6, first full paragraph: The method for determining the hydraulic gradient is unclear; it refers to a mean, but only notes one low and high tide figure. The most appropriate approach would be a time weighted average over several tidal cycles representative of spring and neap tides.

   Response: Nobis agrees, but given the uncertainty of some of the other variables in determining groundwater flow (e.g. hydraulic conductivity) and the range/impact of tidal cycles, the calculated gradient may be sufficient.

5. Section 3.5.1: The Mass Flux Evaluation was limited to TCE "because this constituent is the most widespread and has been detected at the highest concentrations in bedrock water-bearing fractures." The Phase III then states that: "Although PCBs have been detected above UCLs in one bedrock well (MW-15B), PCBs have much lower mobility and therefore were not considered a driver for the mass flux calculations." EPA does not agree with AVX's rationale for limiting the mass flux evaluation to TCE. As noted in the report, PCBs are above the UCL in MW-15B, immediately adjacent to the river, and PCBs co-located with CVOCs are mobile. In addition, pursuant to the Phase II, average groundwater concentrations exceeding the Method 3 GW-3 standard for PCBs were found in bedrock wells MW-2B, MW-6B, MW-13B, MW-15B, and MW-17B. The Phase III compares the calculated TCE pore water concentration to the Method 1 GW-3 standard for TCE of 5,000 ug/L to conclude that active remediation of bedrock groundwater is not required to reduce concentrations in pore water in the sediments beneath the river. However, the Method 1 GW-3 standard for PCBs is 10 ug/L, a much more stringent comparative criterion. In addition, the National Recommended Water Quality Criteria for PCBs for protection of aquatic life in 0.03 ug/L. EPA recommends that the mass flux evaluation address PCBs and other COCs to evaluate impacts from bedrock groundwater to sediments beneath the river. Further, although not explicitly stated in the text, the calculation presented in Appendix B estimates that over 260 pounds of TCE (along with an unspecified mass of associated PCBs) would be released annually into harbor pore water. Given the high organic content of estuarine sediments, contaminants entering the sediment pore water system via groundwater discharge are expected to preferentially bind to the organic matter resulting in recontamination of harbor sediments.

DRAFT

Response: Note that most of the monitoring wells exceeding GW-3 for PCBs also exceed GW-3 for TCE, with the exception of MW-2, MW-2B (screened 35.7-45.7 ft bgs), and MW-6B (screened 46.5-56.5 ft bgs). While MW-6B is located along the central northern edge of the property, MW-2B is located in the area of DNAPL in soil and is close to the Acushnet River. For similar contaminants, it may be acceptable to use a single "marker" contaminant to evaluate remedial options. However, PCBs have significant differences from CVOCs in chemistry and fate and transport, and therefore Nobis agrees that the mass flux should be evaluated for PCBs as well.

6. <u>Section 4.3.3.1, OU3A:</u> Two locations north of the sheet pile wall, MIP-54 and MIP-53, have shallow PCB concentrations of 30,500 and 20,500 mg/kg, respectively. In the case of MIP-53, there is no peat noted in the boring log. These are some of the highest concentrations in soil on the Aerovox site and these soils are not bounded to the east by a sheet pile wall and may not be bounded vertically by a peat layer. These locations are not addressed as part of OU3A remedy so this high level of contamination is unaddressed by the Phase III.

   Response: Figure 4.3.3A-1 and 4.3.3A-2 appear to present excavation to 13 feet bgs in the area of MIP-53 and MIP-54. The area downgradient of these soil locations are targeted for in-situ treatment of groundwater hot spots, and appear to be within the vertical containment barrier (as applicable) in Figure 4.3.3B-1 through Figure 4.3.3B-4. (note that the section numbers are mis-numbered in Section 4.2.3 and the EPA comment refers to the section numbers as written)

7. <u>Section 4.3.3.1, OU3A, page 4-10:</u> Three alternatives are identified and all include containment in the form of caps, an engineered barrier over contaminated soils. There is no discussion of containment of soils to the east so they do not cross-contaminate water and sediments in the Harbor. Soils on the eastern side of the site are vulnerable to sloughing into the harbor as the peat deteriorates and the sheet pile wall falls into disrepair. Containment of soils on the eastern boundary needs to be addressed. If the comprehensive remedy will rely on the current sheet pile wall to be an effective barrier, an evaluation on its viability to serve as an engineering control while excavations are planned adjacent to it must be performed. Please refer to EPA's significant concerns with the effectiveness of the existing sheet pile wall detailed in our comments on the IRA

Status Report #4 emailed to MassDEP on 9/22/15.

Response: Evaluation of the sheet pile wall during the IRA excavation, and any modifications (9/7/16 and 9/14/16 meeting notes) should be included in the Phase III.

8. <u>Section 4.3.3.2, Alternative OU3B-4</u>:

   a. The OU3B-4 alternative discussion states: "Most of the COC mass in the groundwater is expected to be TCE and therefore the primary function of the PRB media will be degradation by ZVI…" As documented in the Phase II, groundwater is contaminated with CVOCs and PCBs. EPA suggests in comments herein that AVX calculate the mass of PCBs in overburden and bedrock groundwater. EPA does not concur with the implication that the mass of PCBs in groundwater migrating to the river do not need to be controlled.

   b. The selected remedy for OU3B includes biological remediation of the source soils which contain both mobile and residual DNAPL. Further, this DNAPL is a mixture of CVOCs and PCBs. Enhanced reductive dechlorination (ERD) is not guaranteed to eliminate all of the DNAPL within this zone, certainly not within the projected timeframe of "approximately 10 years". Thus, control of the flux of COCs from the site should be assumed to be needed for more than 10 years. It appears that the ERD element of the remedial alternative for OU3 groundwater is expected to reduce the PCB concentrations within the deep overburden. However, PCBs are not reliably remediated using ERD. [Note, Section 4.1.1.1 states in-situ soil bioremediation and chemical oxidation are "not effective for PCBs".]

DRAFT

Response: Responses noted below using the same lettering system as the comments.

   a. Nobis agrees – see response to specific comment 5 above. The PCBs need to be controlled to the extent practicable.
   b. Laboratory studies (Payne et al, 2011) have shown that ERD may be somewhat effective. However, the effectiveness should be evaluated and demonstrated in laboratory studies with site media. Nobis agrees that ERD is unlikely to be effective in managing PCBs in a passive treatment system such as a PRB. Note

that the MCP allows the PRP to choose the remedy following MassDEP guidance, which does allow flexibility in remedy selection.

9. Section 4.2.4: In Section 4.1.2.1, containment was retained as an alternative for groundwater. However, the OU4 bedrock groundwater alternatives presented in the summary of remedial alternatives did not consider containment in any of the alternatives evaluated for the bedrock groundwater.

   Response: Nobis agrees, and recommended including bedrock hydraulic control.

10. Section 5.3.1.5, page 5-8: The rating appears to more heavily weigh short-term risks during construction and diminishes risks posed by leaving soils above UCLs at the site.

    Response: The risk ratings are described more fully in Table 5.3, page 2. The long-term risk associated with remaining oil and hazardous materials were all classified as no substantial hazard (which must be demonstrated in accordance with 40.0956: Substantial Hazard Evaluation). Nobis agrees that alternative OU3-A3 should reduce the rating from “good” to “fair” as leaving material above UCLs in-place would present a higher long-term potential risk than the alternatives which remove such soil.

11. Section 5.3.1.8, page 5-8: Considering the City’s comments on the preliminary Phase III, the “very good” rating for this non-pecuniary factor should be reconsidered.

    Response: Nobis agrees that the City’s primary concern was with material left in place. Therefore, the alternative with the most material left in place (OU3-A3) would have the lowest community acceptance rating and the other two alternatives would have higher ratings. Recommend changing the non-pecuniary score for OU3-A3 to a value below the other alternatives.

12. Section 5.3.2.4, page 5-10: The Phase III notes: “OU3B-3 has a poor cost rating due to the highest cost to implement and even greater energy consumption than OU3B-2 due to the additional in situ treatment of soil.” However, the 30-year net worth of OU3B-3 is lower than OU3B-2 noted in the table. This seems to imply that OU3B-3 has a lower energy consumption over time than OU3B-2, which contradicts the statement in the text.

Response: The first part of the comment is true and should be addressed. Note that an alternative can be both higher cost and lower energy, depending on the method used). Also note that Table 5.3, page 5 appears to have a typo, with only a 20 year NPV for alternative OU3-B2. If the NPV is indeed 20 years, the calculations should be based on a 30-year NPV to be in line with the text.

13. <u>Section 6.3.2, page 6-3:</u> The Phase III indicates that OU3B-3 has a moderate to high-likelihood of achieving a Permanent Solution while OU3B-4 has a high likelihood of achieving a Permanent Solution. This should be reconsidered in light of potential issues with PRBs noted above.

    Response: Nobis agrees that OU3B-4 may be too highly rated. It may be more realistically characterized as having a moderate to high likelihood of achieving a permanent solution.

14. <u>Section 8.2.2:</u> What are the protocols for evaluating the results of the Pilot Studies proposed for evaluation of the treatment elements of OU3B-4, the Perwmeable Reactive Barrier Wall and In-Situ Treatment of Hot Spots? How will monitoring be performed, particularly considering the levels of contamination that exists on both sides of where the pilot wall is proposed and the reversing groundwater flow directions that result from tidal influence? Consistent with the additional comments noted herein, EPA has significant reservations about the technical practicability and constructability of the permeable reactive barrier wall proposed for this Site.

    Response: MassDEP would need to approve the remediation implementation plan (Phase IV), which would also include a monitoring plan and appropriate treatability/pilot studies. Nobis shares EPA's reservations about the practicability of the PRB, as described in other comments.

15. Appendix C: Groundwater Modeling: It is noted that a groundwater flow model was developed for use in the remedy evaluations presented in the Phase III. Ultimately, if some form of low permeability containment or in-situ permeable reaction barrier is employed for the remedy, the groundwater model will provide one tool for design and

DRAFT

assessment of the remedial system. As such, it is recommended that the groundwater model be subjected to a more comprehensive review to better evaluate its reliability to support these objectives. The following issues appear to limit the ability of the current model formulation to represent the actual conditions of groundwater flow:

a. The assignment of hydraulic conductivity values for the various formation units included within the model are based on a sparse set of slug tests or other evaluations for existing wells throughout the aquifer. As an example, the following wells delineate a north-south transect of locations within the overburden and bedrock aquifers immediately upgradient and parallel to the existing sheet pile wall: MW-15D, MW-15B, MW-07A, MW-07, MW-07B, MW-02A, MW-02, MW-02B, MW-17D, MW-17B and MW-32B. Based on review of the Phase II Comprehensive Site Assessment, it appears that only three of these wells have been subjected to any testing to assess the ability of aquifer materials to transmit groundwater.

b. The lateral extent of the projected peat layer does not fully correspond with data from the Phase II CSA. Specifically, data from boring locations MIP45, MIP46 and MIP47 revealed no detectable peat interval. Given the observed locations of high contaminant concentrations that potentially migrate to the Acushnet River occurring in a north-south aerial band on the property that parallels the shoreline, it is important that the distribution of hydrogeologic units incorporated within the three-dimensional model domain represent site conditions. The construction of the model domain will influence the results of the model calibration, including the appropriate numerical value assigned to the vertical conductivity of the modeled unit containing peat.

c. Insufficient detail is provided to assess the quality of the steady-state model calibration results. While a comparison of observed and modeled groundwater elevation is provided (Appendix C, Figure 1-7), there is no accompanying documentation for the examined wells to facilitate evaluation of potential systematic bias that should be used to ascertain the adequacy of the assumed model domain construction.

Response: Responses noted below using the same lettering system as the comments.

DRAFT

a. Nobis agrees. Especially given that the groundwater was sensitive to variations in hydraulic conductivity, a better range of values would be useful not just for the modeling itself, but an evaluation of the utility of injections.
b. Nobis agrees, and references comments issued to MassDEP regarding modeling of the peat and outwash unit (1) and boundary conditions (2).
c. Note: the requested documentation can be a table of modeled elevations and the field measurements, and does not appear to be a significant issue.

4.0 REFERENCES

AECOM, 2015. Phase II Comprehensive Site Assessment. Former Aerovox Facility, 740 Belleville Avenue, New Bedford, Massachusetts, RTN 4-0601. September 18, 2015.

AECOM, 2016a. Immediate Response Action Status Report #6, Former Aerovox Facility, 740 Belleville Avenue, New Bedford, Massachusetts, RTN 4-0601. February 2016.

Broooks, K. B, Quinn, J. W., Clausen, C. A. and Geiger, C. L., 2005. *Application of emulsified zero-valent iron to marine environments*. NASA Kennedy Space Center, report KSC-2005-112. January 1, 2005

Brown and Caldwell, 2016a. Immediate Response Action Status Report # 7, Former Aerovox Facility. August 2016.

Brown and Caldwell, 2016b. Phase III Remedial Action Plan – RTN 4-601, Former Aerovox Facility, New Bedford, MA. August 2016.

Brown and Caldwell, 2016c. Meeting Minutes: Weekly IRA Progress Meeting #5, September 7, 2016. Former Aerovox Facility, New Bedford, MA. September 2016.

Kueper, B. H. and Davies, K. L., 2009. Assessment and Delineation of DNAPL Source Zones at Hazardous Waste Sites. EPA/600/R-09/119. September 2009.

MassDEP, 2016. Approval of Partial Phase II Comprehensive Site Assessment, Identification of Deficiencies, Request for Phase III Remedial Action Plan, Amendment to Administrating

DRAFT

Consent Order and Interim Deadline, New Bedford-BWSC, RTN 40-0000601. March 11, 2016.

Payne, R. B., May, H. D, and Sowers, K. R., 2011. *Enhanced reductive dechlorination of polychlorinated biphenyl impacted sediment by bioaugmentation with a dehalorespiring bacterium*. Environ. Sci. Technol. 45(20): 8772-8779. October 15, 2011.

DRAFT